

Improving the discovery potential of High Purity Silica in Australia

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ABSTRACT

High Purity Silica (HPS) is the principal raw material in the production of silicon used to manufacture high technology products including semiconductors and solar cells. Quartz (SiO₂) is the most abundant silica mineral in the Earth's crust; however, economic deposits of high purity quartz (HPQ; SiO₂ >99.995%) are rare. Rapid acceleration towards reaching net zero emissions has seen a parallel increase in demand for the discovery of new HPQ deposits for downstream processing. As a part of the Australian Critical Minerals Research and Development Hub, Geoscience Australia is addressing this demand by generating the first mineral systems model and accompanying national scale mineral potential map to help explorers accelerate discovery.

Two new mineral systems models are being developed for i) all pegmatite types and, ii) metamorphically-derived hydrothermal quartz veins. The two mineral systems are combined into key components, including geodynamic and geological setting, geodynamic drivers and fluid drivers. Each of the components have been subsequently converted into discrete mappable layers as part of the GIS-based process of generating a combined national mineral prospectivity map for deposit-scale accumulations of silica and quartz. A new, first generation, mineral prospectivity map has been developed for the combined pegmatite and hydrothermal quartz mineral system and, has already highlighted the massive potential in Australia for hosting both types of HPS occurrences at economically viable scales.

The mineral potential map has already been used to define a suite of sample locations in which to help define the best source for HPS. Further, we are undertaking the first national scale sampling and analytical geochemistry campaign to examine the impact of mineral systems on quartz purity and develop the Explorers' Toolbox - an industry applicable, best practice guideline for the characterisation of potential HPS deposits in Australia.